

APR 13 2009

Amendments to the Claims:

1. (Currently amended) An ultra-wide-band (UWB) physical layer using time-frequency interleaved (TFI) orthogonal frequency division multiplexing (OFDM) within the 3.1 – 10.6 GHz UWB band, comprising:
 - a band of frequencies divided into contiguous bands of tones;
 - a plurality of OFDM symbols, each OFDM symbol having a plurality of tones from a respective contiguous band; and
 - a data payload of the plurality of OFDM symbols for communication between a transmitter and a receiver, wherein consecutive OFDM symbols use different subsets of tones interleaved in time and frequency.
2. (Previously amended) The UWB physical layer according to claim 1, wherein the UWB physical layer further employs TFI-OFDM, to provide a wireless personal area network (PAN) having data payload communication capabilities of up to 480 Mb/s.
3. (Original) The UWB physical layer according to claim 1, wherein the UWB physical layer is configured to operate as a full-band system.
4. (Original) The UWB physical layer according to claim 3, wherein the UWB physical layer is further configured to generate a single OFDM symbol solely from a contiguous subset of tones.
5. (Cancelled)
6. (Previously amended) The UWB physical layer according to claim 5 1, wherein the UWB physical layer is further configured to vary each subset of tones as a function of time such that the UWB physical layer achieves the same transmit power as a full-band signal that occupies the complete bandwidth spanned by an inverse fast fourier transform.

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7. (Previously amended) The UWB physical layer according to claim 4, wherein the UWB physical layer is further configured to generate a signal having a bandwidth greater than 500 MHz in response to 122 data tones.
8. (Original) The UWB physical layer according to claim 4, wherein the UWB physical layer is further configured to generate a single OFDM symbol solely from a contiguous subset of tones, wherein each subset contains 128 consecutive tones.
9. (Original) The UWB physical layer according to claim 1, wherein the UWB physical layer is configured to operate as a sub-band system.
10. (Previously amended) The UWB physical layer according to claim 9, wherein each OFDM symbol comprises an output of an inverse fast Fourier transform (IFFT) and one of a cyclic prefix and a cyclic postfix.
11. (Original) The UWB physical layer according to claim 10, wherein the UWB physical layer is further configured to insert a guard interval immediately following each OFDM symbol.
12. (Previously amended) An ultra-wide-band (UWB) physical layer comprising a UWB transmitter generating time-frequency interleaved (TFI) orthogonal frequency division multiplexed (OFDM) signals within the 3.1 – 10.6 GHz UWB band, each signal comprising:
 - time domain data generated by an inverse fast Fourier transform (IFFT) of frequency domain data;
 - one of a cyclic prefix and a cyclic postfix; and
 - a guard interval between the time domain data and said one of a cyclic prefix and a cyclic postfix comprising a plurality of zero samples.

13. (Original) The UWB physical layer according to claim 12, wherein the UWB transmitter further generates a guard interval immediately following each OFDM symbol, and wherein the guard interval has a time period sufficient to allow the UWB transmitter to switch from one channel to another.
14. (Original) The UWB physical layer according to claim 12, further comprising a UWB receiver configured to receive TFI-OFDM signals, wherein the UWB transmitter and the UWB receiver together form a personal area network (PAN).
15. (Previously amended) A modulation scheme for ultra-wideband (UWB) systems, the scheme comprising the method steps of:
 - providing a UWB physical layer operational to generate orthogonal frequency division multiplexed (OFDM) symbols within a desired band;
 - interleaving the OFDM symbols across both time and frequency to divide the desired band into smaller sub-bands; and
 - inserting a guard interval comprising plural zero samples after each OFDM symbol, such that the UWB physical layer has sufficient time to switch from its current channel to the next channel.
16. (Original) The modulation scheme according to claim 15, wherein the desired band comprises the 3.1 – 10.6 GHz UWB band.
17. (Original) The modulation scheme according to claim 15, wherein the physical layer is further operational to support a wireless personal area network (PAN) having data payload communication capabilities of 55, 80, 110, 160, 200, 320 and 480 Mb/s.
18. (Original) The modulation scheme according to claim 15, wherein the UWB physical layer is further operational to generate a single OFDM symbol solely from a contiguous subset of tones.

19. (Original) The modulation scheme according to claim 15, wherein the UWB physical layer is further operational to employ different subset of tones between consecutive OFDM symbols.
20. (Original) The modulation scheme according to claim 19, wherein the UWB physical layer is further operational to vary the subset of tones as a function of time such that the UWB physical layer achieves the same transmit power as a full-band signal that occupies the complete bandwidth spanned by an inverse fast fourier transform.
21. (Previously amended) The modulation scheme according to claim 15, wherein the UWB physical layer is further operational to generate a signal having a bandwidth greater than 500 MHz in response to 122 data tones.
22. (Original) The modulation scheme according to claim 15, wherein the UWB physical layer is further configured to generate a single OFDM symbol solely from a contiguous subset of tones, wherein each subset contains 128 consecutive tones.
23. (Previously added) The UWB physical layer according to claim 1, wherein the plurality of OFDM symbols are interleaved across a plurality of consecutive sub-bands.
24. (Previously added) The UWB physical layer according to claim 23, wherein the plurality of consecutive sub-bands is 3 and wherein the pattern of time-frequency interleaving across the consecutive sub-bands is [1 3 2 1 3 2 ...].
25. (Previously added) The UWB physical layer according to claim 23, wherein each sub-band comprises a respective center frequency.

26. (Previously added) The UWB physical layer according to claim 1, wherein the plurality of OFDM symbols are transmitted according to a power spectral density (PSD) mask having 0 dB relative to a maximum PSD of the signal at an offset of 260 MHz from a respective center frequency, -12 dB relative to the maximum PSD of the signal at an offset of 285 MHz, and -20 dB relative to the maximum PSD of the signal at an offset of 330 MHz.
27. (Previously added) A UWB physical layer as in claim 12, wherein the frequency domain data is generated in the frequency domain.
28. (Previously added) A UWB physical layer as in claim 12, wherein the frequency domain data is generated from time domain data by a discrete Fourier transform (DFT).
29. (Previously added) A UWB physical layer as in claim 12, wherein the bandwidth of the OFDM signals is at least 500 MHz.
30. (Previously added) A UWB physical layer as in claim 12, wherein the IFFT produces the time domain data from 128 contiguous tones.
31. (Previously added) A UWB physical layer as in claim 12, wherein the frequency domain data comprises encoded information bits and pad bits.
32. (Previously added) A UWB physical layer as in claim 31, wherein the information bits and pad bits are encoded using a $R=1/3$, $K=7$ convolutional code.
33. (Previously added) A UWB physical layer as in claim 31, wherein the encoded information bits and pad bits are punctured to generate various coding rates from $R=11/32$ to $R=3/4$.

34. (Previously added) A UWB physical layer as in claim 32, wherein the encoded bits are interleaved, mapped onto symbols, and then onto tones.
35. (Previously added) A UWB physical layer as in claim 34, wherein tones include pilot tones that are randomized according to a cover sequence.